Coastal Habitat Index (334)

Coastal wetlands are vegetated interfaces between the aquatic and terrestrial components of estuarine ecosystems. They are a unique and valuable resource that provides habitat for a wide variety of plant and animal species. An estimated 95% of commercial fish and 85% of sport fish spend a portion of their life cycles in coastal wetland and estuarine habitats. Adult stocks of commercially harvested shrimp, blue crabs, oysters, and other species throughout the United States are directly related to wetland quality and quantity (Turner and Boesch, 1988). This irreplaceable resource has been diminishing over the years largely due to urban and rural development (Dahl, 2000).

In this indicator, for all regions except the Great Lakes, coastal habitat was assessed by measuring coastal wetland loss using data based on a special study by the National Wetlands Inventory Status and Trends Survey (NWI). For the Great Lakes, the index is based on an assessment that includes amphibian abundance and diversity, wetland-dependent diversity and abundance, coastal wetland area by type, and the effects of water level fluctuations. Wetland loss was measured in acres and assessed by taking an average of the mean long-term decadal loss rate (1780-1990) and the present decadal loss rate (1990-2000). Regions were assigned scores based on this average. Condition ratings were assigned as follows: high (score >4) if the coastal habitat index value was less than 1.0; moderate (score between 2-4) if the index value was between 1.0 and 1.25; and low (score <2) if the index value was greater than 1.25.

What the Data Show

Overall, the nation's coastal wetlands received a score of 1.26 on the coastal habitat index and alow condition rating (score = 1.0) (Figure 334-1). This rating was determined by averaging the 0.2 percent recent rate of decadal loss and the mean long-term decadal loss rate of 2.3 percent. The highest regional index values (translates to lowest condition rating scores) were observed in West Coast estuaries (index score 1.9 and condition score 1.0) and in Gulf Coast estuaries (index score 1.30 and condition score 1.0) where the majority of the nation's wetlands exist. The best condition was seen in the Northeast estuaries where the habitat index was 1.0 and the condition score 4.0. This data cannot be analyzed by EPA Region.

Indicator Limitations

- Data for Alaska, Hawaii, and Puerto Rico were not included in this analysis. Approximately 75 percent of the nation's estuaries are located in Alaska.
- There is insufficient information to compare National Coastal Condition Reports I and II for trend data. NCCR I presented an index based on 1780 to 1990; NCCR II presented the index based on 1780-2000.
- NWI maps do not show all wetlands since the maps are derived from aerial photointerpretation with varying limitations due to scale, photo quality, inventory techniques, and other factors.

Data Sources

Data for this indicator were provided from a special study by the National Wetlands Inventory to be compiled and presented in the National Coastal Condition Report II, U.S. Environmental Protection Agency, 2004. This report was prepared by EPA's Offices of Water and Research and Development.

Dahl. T.E. 1990. *Wetlands – Losses in the United States 1780's to 1980's*. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Report to Congress, Washington, D.C.
http://www.npwrc.usgs.gov/resource/othrdata/wetloss/wetloss.htm

Dahl, T.E. 2003. Results of the 2000 National Wetlands Inventory. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. Unpublished draft.

References

Turner, R.E. and D.F. Boesch. 1988. Aquatic animal protection and wetland relationships: Insights gleaned following wetland loss or gain. In *The Ecology and Management of Wetlands*. Volume 1: Ecology of Wetlands, D.D. Hook, W.H. McKee, Jr., H.K. Smith, J. Gregory, V.G. Burrell, M.R. Devoe, R.E. Sojka, S. Gilbert, R. Banks, L.H. Stolzy, C. Brooks, T. D. Matthews, and T. H. Shear (eds). Portland, OR: Timber Press.

Dahl, T.E. *Status and Trends of Wetlands in the Conterminous United States 1986 to 1997*, Washington, D.C.: U.S. Department of the Interior, U.S. Fish and Wildlife Service, 2000. http://wetlands.fws.gov/bha/SandT/SandTReport.html

Graphics

Table 334-1. Summary of Condition Based on the Coastal Habitat Index[a]

Coastal Region	Condition Score (1=low; 5=high)	Coastal Habitat Index Value
Northeast	4	1.00
Southeast	3	1.06
Gulf	1	1.3
West	1	1.9
Great Lakes	2	Not available
All U.S.[b]	1.7	1.26

Source: National Coastal Condition Report II, U.S. EPA, 2004.
[a]The coastal habitat index is based on the average of the mean long-term decadal wetland loss rate (1780-1990) and the present decadal wetland loss rate (1990-2000).
[b]The national score is based on an aerially weighted mean of the regional scores.

R.O.E. Indicator QA/QC

Data Set Name: COASTAL HABITAT INDEX
Indicator Number: 334 (89134)
Data Set Source: NWI (2002)
Data Collection Date: 1999-2000
Data Collection Frequency: Every ten years
Data Set Description: An indicator of the proportional change in regional coastal wetlands over a 10 year period combined with the long-term decadal losses.
Primary ROE Question: What are the trends in extent and condition of coastal waters

Question/Response

T1Q1 Are the physical, chemical, or biological measurements upon which this indicator is based widely accepted as scientifically and technically valid?

Yes. Source imagery, data and data review processes were converted to a digital process for the 2000 dataset were converted to a digital procedure and were revised per the following technical manuals: USFWS, 2004. Technical Procedure for Wetlands Status and Trends. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 62 pp.USFWS, 2004. National Standards and Quality Components for Wetlands, Deepwater and Related Habitat Mapping. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 19 pp.Data collection methods for the 1990 survey are described in the references listed below. Dahl. T.E. 1990. Wetlands Losses in the United States, 1780 s to 1980 s. U.S. Dept of the Interior, Fish and Wildlife Service, Report to congress, Washington, DC. http://www.npwrc.usgs.gov/resource/othrdata/wetloss/wetloss.htm NWI (National Wetlands Inventory). 2002. Results of the 2000 wetlands inventory. http://wetlands.fws.gov/

T1Q2 Is the sampling design and/or monitoring plan used to collect the data over time and space based on sound scientific principles?

Yes. The sampling design for the coastal indicator was developed by an interagency group of spatial sampling experts specifically to monitor wetland changes. It can be used to monitor conversions between ecologically different wetland types, as well as, measure wetland gains and losses. This sample design has been used successfully by several researchers (Hefner et al. 1994; Moulton et al. 1997; Dahl 1999; and others), to monitor wetland change over time. The NWI status and trends dataset from 1986 to 1997 did not have the required data for developing the coastal indicator. Where statistical estimates were lacking or outdated, estimates of wetland extent were supplemented with updated map data from 1990 and 2000. These include data on West Coast intertidal wetlands. These products were produced using standardized, accepted techniques. Components of data quality for wetlands and deepwater habitat maps are specified in: USFWS, 2004. National Standards and Quality Components for Wetlands, Deepwater and Related Habitat Mapping. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 19 pp.

T1Q3 Is the conceptual model used to transform these measurements into an indicator widely accepted as a scientifically sound representation of the phenomenon it indicates?

The scientific integrity of the Wetlands Status and Trends is unchallenged as it represents the most comprehensive and contemporary effort to track wetlands resources on a national scale. The Fish and Wildlife Service strives to present information on wetlands, deepwater and related

habitats in an accurate, clear, complete and unbiased manner. To ensure the effectiveness and reliability of wetland status and trends data, the Service has established these procedural guidelines and adheres to the various quality assurance and quality control measures described. The goal of these guidelines and protocols is to ensure that the data collection, analysis, verification and reporting methods used produce information suitable to support decisions for which the data was intended.

T2Q1 To what extent is the indicator sampling design and monitoring plan appropriate for answering the relevant question in the ROE?

The Wetlands Status and Trends sample was designed to be a quantitative estimate of the areal extent of all coastal wetlands in the conterminous United States. Wetlands mapping efforts encompasses all wetlands of the conterminous 48 states and Puerto Rico, including coastal wetlands. Only data related to the coastal wetlands from the 23 coastal states and territories were included in the development of this index.

T2Q2 To what extent does the sampling design represent sensitive populations or ecosystems?

The sampling design targets wetlands which are considered to be sensitive ecosystems.

T2Q3 Are there established reference points, thresholds or ranges of values for this indicator that unambiguously reflect the state of the environment?

The national value of the coastal habitat index is a weighted mean that reflects the extent of wetlands in each region. The calculated index scores range from 1.0 representing acceptable condition to greater than 1.25, representing less than acceptable condition. The use of this rating was consistent across all geographic areas.

T3Q1 What documentation clearly and completely describes the underlying sampling and analytical procedures used?

http://policy.fws.gov/905fw1.html This chapter provides guidance for conducting habitat mapping by the National Wetlands Inventory.Also see: USFWS, 2004. Technical Procedure for Wetlands Status and Trends. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 62 pp.USFWS, 2004. National Standards and Quality Components for Wetlands, Deepwater and Related Habitat Mapping. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 19 pp.

T3Q2 Is the complete data set accessible, including metadata, data-dictionaries and embedded definitions or are there confidentiality issues that may limit accessibility to the complete data set?

See: http://wetlandsfws.er.usgs.gov The Service's wetland Status and Trends plot locations are considered proprietary information. Their location shall not be disclosed by copying or transmitting plot locations, geographical coordinates, or other locator information. Plots boundaries or data shall not be displayed, published or otherwise distributed. Copyright or use restrictions may also apply to the imagery used to update the plot information.

T3Q3 Are the descriptions of the study or survey design clear, complete and sufficient to enable the study or survey to be reproduced?

http://policy.fws.gov/905fw1.html National estimates of the wetland status and trends (i.e., losses and gains), developed through statistical sampling, are made at approximately 10-year intervals contingent on funding. These estimates are used to evaluate the effectiveness of Federal programs and policies, identify national or regional problems, and increase public awareness. All are referenced in scientific literature and are used by Federal and State agencies, the scientific community and conservation groups for planning, decision making and wetland policy formulation and assessment. This design has been reproduced in whole or in part for coastal areas by the following authors: Tiner 1987; Frayer and Peters 1989; Hall et al. 1994; Hefner et al. 1994; Moulton et al. 1997; Dahl 1999, 2005.

T3Q4 To what extent are the procedures for quality assurance and quality control of the data documented and accessible?

http://policy.fws.gov/905fw1.html NWI map production includes many quality control steps prior to releasing the final product, these are outlined at the website provided. Wetlands status and trends procedures for the coastal data are documented and available in the following technical manual: USFWS, 2004. Technical Procedure for Wetlands Status and Trends. U.S. Dept of the Interior, Fish and Wildlife Service, Branch of Habitat Assessment, Arlington, VA. 62 pp.

T4Q1 Have appropriate statistical methods been used to generalize or portray data beyond the time or spatial locations where measurements were made (e.g., statistical survey inference, no generalization is possible)?

Yes. The wetland status and trends studies were based on a scientific probability sample of the surface area of the coastal areas for the 48 conterminous States and territories using a stratified, simple random sampling design. The statistical design including inference of data beyond spatial measurements are described in Dahl, 2000.

T4Q2 Are uncertainty measurements or estimates available for the indicator and/or the underlying data set?

NWI maps do not show all wetlands, but attempt to show most photointerpretable wetlands given considerations of map/photo scale and wetland delineation practices. A target mapping unit (tmu) is an estimate of the size class of the smallest group of wetlands that NWI attempts to map consistently (i.e, approximately one acre for coastal wetlands); it is not the smallest wetland mapped. http://wetlands.fws.gov/other/metadata/nwi_meta.txt The Fish and Wildlife Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type, and size of these resources. The maps are prepared from by the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. There is a margin error inherent in the use of imagery, thus detailed on-the-ground inspection of any particular site, may result in revision of the wetland boundaries or classification, established through image analysis.The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data, and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

T4Q3 Do the uncertainty and variability impact the conclusions that can be inferred from the data and the utility of the indicator?

The NWI maps do not show all wetlands since the maps are derived from aerial photointerpretation with varying limitations due to scale, photo quality, inventory techniques, and

other factors. Consequently, the maps tend to show wetlands that are readily photointerpreted given consideration of photo and map scale. http://wetlands.fws.gov/other/metadata/nwi_meta.txt

T4Q4 Are there limitations, or gaps in the data that may mislead a user about fundamental trends in the indicator over space or time period for which data are available?

The The purpose of this survey was not to map all wetlands and deepwater habitats of the United States, but rather to use aerial photointerpretation techniques to produce thematic maps that show, in most cases, the larger ones and types that can be identified by such techniques.